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Title: Ion irradiation of porous silicon: the role of surface states

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Los Alamos
NATIONAL LABORATORY

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Ion irradiation of porous silicon: the role of surface states

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Si wafer: p-type B-doped 3Ω-cm

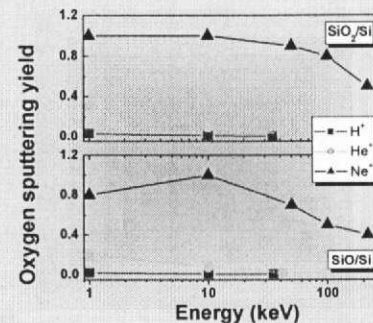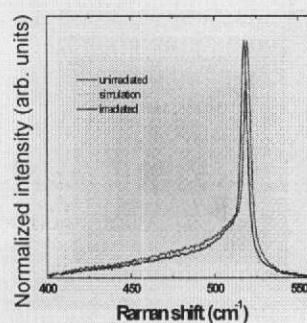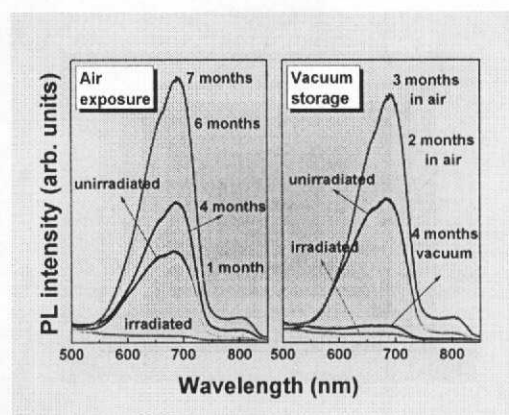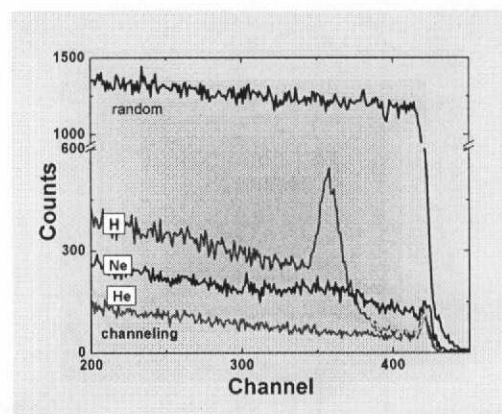Etching: 0.33 mA/cm^2 for 6h in

1:1:2 HF:H$_2$O:ethanol solution

H$^+$ 35 kV, He$^+$ 42 kV, Ne^{++} 109 kV

Range: ~440 nm in c-Si

Doses: 1x10^9 – 7x10^{13} atoms/cm^2
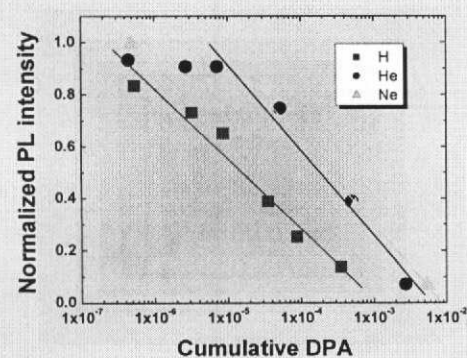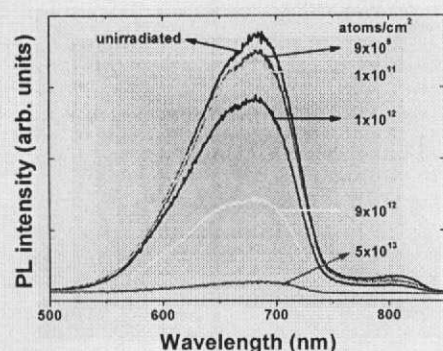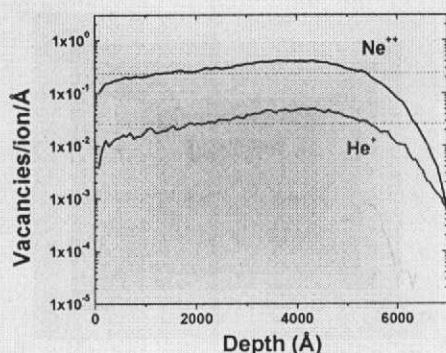
Summary & conclusions:

- Ion irradiation induces PL quenching from po-Si.
- Interaction of the implanted ions with defects generated during the irradiation process plays a major role in the PL quenching mechanism.
- Quenching was associated with the creation of nonradiative states within the gap.
- Exposition to air and consequently the oxidation of the surface is shown to enhance PL emission efficiency.